

Health Consultation

Howard School (4#TN)
Chattanooga, Hamilton County, Tennessee

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U.S. Department of Health and Human Services
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Division of Health Assessment and Consultation
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Background and Statement of Issues

The city of Chattanooga Department of Public Works requested that the Agency for Toxic Substances and Disease Registry (ATSDR) review the "Investigation of Immediate Site Hazards, Howard School and Montague Park," and determine if the recommendations for the Howard School site are protective of public health [1]. A prior health consultation has been written addressing public health issues at the Howard School site by the Tennessee Department of Health (TDH) and provides additional background [2].

Howard School is a part of the Chattanooga Public School System and is located in Chattanooga, Hamilton County, Tennessee, in the Alton Park area. A former unregulated landfill occupies a large portion of the school property. The entire site is approximately 44 acres in size. A day care facility is located on-site and occupies approximately less than 1 acre of the site.

Howard School was built in the mid-1950s and is located 1 block south of the junction of I-24 and Alton Park Boulevard/Market Street. The school is bordered on the north by a public housing project which lies across Machine Street and on the west by Alton Park Boulevard and residential housing. When the school was constructed, it was bordered on the south and east by the Chattanooga Creek [1].

During the 1960s and 1970s the city of Chattanooga operated an unregulated landfill on city property to the south of Howard School and the Chattanooga Creek [1]. In the mid-1970s Chattanooga Creek was rerouted and the Old Channel that formed the boundary of the school property was filled as part of the landfill operations. The landfill was closed in 1977. The landfill closure was conducted by constructing a clay cap over the fill area. No records were available regarding the design of the cap (thickness of the clay layer, permeability of the clay, drainage layers, topsoil or establishment of vegetative cover) [1].

In the late 1980s a day care facility was opened south of the main building of Howard School. The facility provides day care for children ages 6 weeks to 5 years of age. The day care is located on a portion of the old landfill that once had been the main channel of the Chattanooga Creek [1].

A portion of Chattanooga Creek has been added to the National Priority List (NPL). Howard School is approximately 1.5 miles northwest of the of the NPL site. This portion does not include the Old Channel (of the Chattanooga Creek) that borders Howard School. Contamination of the creek is thought to be primarily polyaromatic hydrocarbons (PAHs) from past coal coking and wood creosoteing operations in the Chattanooga Creek watershed. [1].

On May 23, 1994, a public health consultation was written that evaluated possible exposures to PAHs in soils for the Howard School site [2]. The following recommendations were made in the document:

1. Sample and analyze surface soil in areas where exposures are most likely to occur.
2. Sample and analyze gray water in areas where exposures are most likely to occur.

On March 14, 1995, the Tennessee Department of Superfund (TN-DSF) inspected the grounds of the Howard School site to identify areas where exposures were likely to occur and areas where gray water was observed. The number of surface (depth: 0 to 2 inches) and subsurface (depth: 18 inches) soil samples and the locations of the sampling at the Howard School site are as follows (see Attachment 1; Figure 1, Site Map, Howard School): nature trail area (5 surface and 1 subsurface soil samples), Old Channel area (3 surface soil samples), practice field (4 surface samples), day care (5 surface and 5 subsurface soil samples), baseball field (1 surface soil sample), and soccer field (2 surface soil samples). The soil samples were analyzed for eight RCRA metals (arsenic, barium, cadmium, lead, total chromium, mercury, selenium, and silver), volatile organic compounds (VOCs), semi-VOCs, PAHs, polychlorinated biphenyls (PCBs), and pesticides. Contaminants were detected in soil samples at the following maximum concentrations (see Attachment 1; Site Map Howard School and Analytical Results): **sample # HSNT2** (subsurface soil sample located on the nature trail), 298 parts per million (ppm) total PAHs, 120 ppm carcinogenic PAHs (sum of 7 carcinogenic PAHs; see Attachment 1); **sample # HSDC6** (subsurface soil sample located in the playground area of the day care), 220 ppm total PAHs, 96.2 ppm carcinogenic PAHs; **sample # HSDC8** (subsurface soil sample located in the playground area of the day care), 655 ppm total chromium.

The day care soil sampling locations were limited to areas outside four bark chip play areas. No soil sampling (surface or subsurface) was conducted in the bark chip play areas.

Gray water was discovered by the TN-DSF when they were conducting prior sampling at the site and broke a small clay tile near the nature trail. The broken clay tile then exposed gray water at the surface of the site near the nature trail. During the inspection on March 14, 1995 it was determined that this clay tile was placed to drain gray water (source appears to be from a sewer line) into storm drains that run adjacent to the Old Channel of the Chattanooga Creek and are presumed to empty into Chattanooga Creek [1]. The source of the gray water was not sampled by the TN-DSF because they have planned to repair and cover the clay tile [1]. To date, the clay tile has not been repaired.

The City of Chattanooga has provided the following recommendations for the Howard School site in the report, "Investigation of Immediate Site Hazards, Howard School and Montague Park" [1]:

1. The Old Channel area should be posted and fenced.
2. No digging should be allowed in the nature trail area and activities should be limited to those of an observational nature.
3. The surface soil at the day care facility should be removed to a depth of approximately 18 inches and an impermeable barrier be placed at that level. A reasonable design for this barrier would be a 6 inch layer of native clay compacted so as to obtain a permeability of 1×10^{-6} cm/sec overlain by a synthetic liner and drainage mat. The remaining foot would be filled using clean fill and topsoil.

Discussion

A large portion of the Howard School site is occupied by a former unregulated landfill. No information exists regarding the design of the landfill cap, the current integrity of the existing landfill cap, or who is responsible for future maintenance of the landfill cap.

PAHs were detected in subsurface soil samples on the nature trail (298 ppm total PAHs, 120 ppm carcinogenic PAHs) and at the day care facility (220 ppm total PAHs, 96.2 ppm carcinogenic PAHs) of the Howard School site. Total chromium (655 ppm) was also detected in subsurface soils of the day care facility. Exposures to the subsurface contaminated soils are unlikely to occur unless the soils are brought to the surface from excavation, digging, etc.

The soil sampling at the day care facility did not include the bark chip play areas of the playground.

The gray water identified at the site by TDH and TN-DSF was not sampled. A broken clay tile is said to be responsible for the gray water surface seepage onto the site.

Conclusions

The recommendations made by the city of Chattanooga for the Howard School site are protective of public health. However, additional recommendations are necessary to ensure that potential public health threats do not exist at this site.

The contaminants (PAHs and total chromium) detected in subsurface soils on the nature trail and at the day care facility do not represent a public health threat because these are not accessible. However, if these contaminants are brought to the surface from excavation, digging, etc., a potential public health threat may exist from dermal contact with soil, ingestion of soils, or inhalation of dust from contaminated soils. All other contaminants detected in surface and subsurface soils were below levels of public health concern.

Since no surface or subsurface soil samples were collected from the playground areas covered with bark chips at the day care facility, ATSDR cannot determine if a potential public health threat exists from exposures to these soils.

Because the gray water surface seepage was not sampled at the site and the clay tile remains broken allowing the gray water run-off to continue on-site, ATSDR cannot determine if a potential public health threat exists from exposure to the gray water.

ATSDR concurs with the recommendation to fence and post with signs the Old Channel of the Chattanooga Creek, based on the following: the boundary of the Old Channel of Chattanooga Creek follows essentially the same boundaries of the landfill (see Attachment 1; Site Map), no information exists on the integrity of the landfill cap, and limited soil data exists near and on the boundary (only four surface soil samples collected near the landfill boundary). Fencing and posting of this area with signs is prudent public health practice.


Recommendations

In addition to the recommendations made by the city of Chattanooga to protect public health at the Howard School site, and based on the information evaluated, ATSDR provides the additional following recommendations:

1. Adequately characterize the nature and extent of the on-site gray water. Disregard this recommendation if the clay tile has been repaired and gray water seepage at the surface no longer represents a potential public health threat .
2. Determine and monitor the integrity of the landfill cap to ensure that no future public health threat exists.
3. Adequately characterize the nature and extent of contamination in surface (0 to 3 inches) and subsurface soils in the bark chip areas of the playground to determine if contaminants present a public health threat. Disregard this recommendation if the City of Chattanooga's recommendation to excavate, line, backfill, and cap the bark chip play areas of the playground is followed.



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Concurred:

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References:

1. "Investigation of Immediate Site Hazards Howard School and Montague Park," prepared by Associated Environmental Services, Inc. for the city of Chattanooga, June 22, 1995
2. Public Health Consultation for Howard School. May 23, 1994. Tennessee Department of Health.

Attachment 1

Howard School Site Map and Analytical Data

Table 1
Data Summary for Howard School

Sample #	Metals Data mg/Kg							
	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
HSNT1	6.62	118.00	<0.1	117.00	67.10	<0.01	<1.50	6.40
HSNT2	5.63	146.00	<0.1	40.50	223.00	<0.01	<1.50	<0.500
HSNT3	3.20	138.00	<0.1	141.00	91.40	<0.01	<1.50	8.20
HSNT4	5.83	105.00	<0.1	151.00	154.00	<0.01	<1.50	<0.500
HSNT5	7.62	42.60	<0.1	24.20	27.50	<0.01	<1.50	<0.500
HSNT6	8.24	50.50	<0.1	16.70	29.50	<0.01	<1.50	<0.500
HSOC1	4.23	60.80	<0.1	18.90	65.60	<0.01	<1.50	<0.500
HSOC2	5.35	67.20	<0.1	23.50	48.30	<0.01	<1.50	<0.500
HSOC3	3.11	47.00	<0.1	16.40	63.80	<0.01	<1.50	<0.500
HSPF1	4.04	79.30	<0.1	26.50	63.40	<0.01	<1.50	1.17
HSPF2	3.12	72.90	<0.1	15.20	29.50	<0.01	<1.50	<0.500
HSPF3	6.65	119.00	<0.1	38.30	140.00	<0.01	<1.50	<0.500
HSPF4	2.40	129.00	<0.1	14.90	23.60	<0.01	2.27	<0.500
HSDC1	3.59	46.40	<0.1	14.90	24.80	<0.01	<1.50	<0.500
HSDC2	5.84	41.60	<0.1	12.50	11.80	<0.01	<1.50	<0.500
HSDC3	3.48	74.00	<0.1	13.80	22.40	<0.01	<1.50	<0.500
HSDC4	4.90	130.00	<0.1	13.00	44.10	<0.01	<1.50	<0.500
HSDC5	4.65	122.00	<0.1	13.60	50.50	<0.01	<1.50	<0.500
HSDC6	3.60	37.00	<0.1	15.20	15.90	<0.01	<1.50	<0.500
HSDC7	5.40	76.40	<0.1	18.30	39.10	<0.01	<1.50	<0.500
+ HSDC8	16.70	153.00	<0.1	655.00	155.00	<0.01	<1.50	<0.500
HSDC9	4.62	105.00	<0.1	12.50	41.30	<0.01	<1.50	<0.500
HSDC10	11.40	144.00	<0.1	29.80	307.00	<0.01	<1.50	<0.500
HSRF1	3.03	59.90	<0.1	14.80	9.25	<0.01	<1.50	<0.500
HSSF1	5.99	86.60	<0.1	24.40	62.40	<0.01	<1.50	<0.500
HSSF2	5.00	66.20	<0.1	12.90	33.60	<0.01	<1.50	<0.500
AVG.	5.56	89.1	<0.1	57.5	71.1	<0.01	<2.27	<5.28
STD. DEV.	2.94	36.7	0.00	125.5	69.4	0.00	0.00	2.98
VARIANCE	8.66	1343.8	0.00	15742.2	4819.9	0.00	0.00	8.89

Table 1 (Cont.)
Data Summary for Howard School

Sample #	Base Neutrals ug/Kg							Dibutylphthalate
	2-Methylnaphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	
HSNT1								1800
HSNT2	540	1200	700	2400	2900	34000	7700	8000
HSNT3						110		
HSNT4		130	250	290	220	3300	930	
HSNT5			180		170	1300	400	
HSNT6								
HSOC1				450	330	3800	980	
HSOC2						580	130	
HSOC3				240	210	3100	710	
HSPF1						620		
HSPF2						280		
HSPF3			750				650	
HSPF4								
HSDC1	260					420		
HSDC2								
HSDC3								
HSDC4								
HSDC5								
HSDC6	1000	2700		5000	4600	33000	10000	
HSDC7						130		
HSDC8				140	130	1400	430	8800
HSDC9				160	140	920		4400
HSDC10	230	210		130	150	1800		5100
HBBF1								3400
HBBF1			200				150	
HBBF2								1300
COUNT	4	4	5	8	9	15	10	7
AVG.	508	1060	412	1101	993	8038	2208	4657
STD. DEV.	309	1036	258	1638	1533	12037	3372	2694

Table 1 (Cont.)
Data Summary for Howard School

Sample #	Base Neutrals ug/Kg						Sum of 7 Carcinogenic PAHs
	Chrysene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Ideco(1,2,3-cd)pyrene	
HSNT1							
HSNT2	1800	3200	2800	790	2000	1200	12040
HSNT3			250			120	370
HSNT4	310	300	450	220	3100	2400	1880
HSNT5	820	600	830	370	620	400	3440
HSNT6	120		270		130	110	630
HSOC1	2400	2500	4600	1700	2600	2300	18620
HSOC2	460		370		820	450	1800
HSOC3	2400		3600	1600	2000	1500	11680
HSPP1	490	420	390		570	810	2380
HSPP2	270		560		280	250	1340
HSPP3	2500	1920	4800	1600	3400	2800	17700
HSPP4							0
HSOC1	290	280	390	270	350	320	1880
HSOC2							0
HSOC3	380		300		420	420	1530
HSOC4							0
HSOC5	230	190	180		250	210	1080
HSOC6	18000	22000	21000	9000	14000	10000	98200
HSOC7	110	110	250		150	120	740
HSOC8	740		480		790	680	2710
HSOC9	480		400		530	510	1920
HSOC10	1000	1100	1300	820	1200	840	6800
HSBF1							0
HSBF1	510	440	1400		690	870	3840
HSBF2	210		540	150	250	240	1400
COUNT	20	12	21	10	20	21	9
AVG.	2818	5377	3558	2561	2592	1754	788
STD. DEV.	5205	9915	7055	3028	4889	3113	851
VARIANCE	2709384	98301106	49769818	9157749	24394876	9653328	723882

Carcinogenic PAHs in Italics

Table 1 (Cont.)
Data Summary for Howard School

Sample #	Base Neutrals ug/Kg				PCB ug/Kg		Sum of all PAHs
	Fluoranthene	Pyrene	Benzo(g,h,i)perylene	Dibutyl benzyl phthalate	Arochlor 1260	Arochlor 430	
HSNT1				450			2050
HSNT2	50000	60000	11000				298840
HSNT3	210	160	120	3500			4470
HSNT4	6300	5800	2300		190		38320
HSNT5	2000	1100	340				8910
HSNT8	230	160					1020
HSOC1	6600	4800	2100				35380
HSOC2	1200	720	420				4830
HSOC3	6700	4000	1500				28120
HSPF1	1400	890	510				5800
HSPF2	840	440	240				2940
HSPF3	2200	1800	2700				25600
HSPF4							0
HSDC1	750	480	330				4120
HSDC2							0
HSDC3	930	600	390				3450
HSDC4							0
HSDC5	610	410	190				2270
HSDC6		52000	9500				220000
HSDC7	290	200	110				1470
HSDC8	1900	1400	530				17440
HSDC9	1400	900	500				10340
HSDC10	2800	1800	840			430	19380
HSBF1							3400
HSSF1	670	470	600				5930
HSSF2	320	230	210				3480
COUNT	20	21	20	2	1	1	
AVG.	4348	6570	1727	1975	190	430	
STD. DEV.	10672	16155	2946	1525	0	0	
VARIANCE	113881819	260994100	8681283	2325625	0	0	